

the Southern Highlands, Lochs Vennachar and Lomond, without revealing its presence by any abrupt surface features. These transverse valleys can be admirably studied in some of the river ravines. The gorges of the Ericht, Isla, and North Esk, indeed, are true cañons, their precipitous walls range from 80 to sometimes 200 feet in height, between which the rivers toil in narrow tortuous chasms. It is easy to examine the strata in these natural sections, and to find conclusive proof that in spite of their fissure-like character the ravines have been cut out of the solid and unbroken Old Red Sandstone, the strata of which can be traced from side to side in undisturbed continuity. The pot-holes marking old levels of water-grinding can be traced at various heights above the present streams, which are still at work deepening their channels in the same way. The contribution therefore which this geological ramble makes to the discussion of an interesting question in the physiography of Great Britain may be put thus:—An enormous dislocation crosses the island along the southern margin of the Highlands. It has not given rise to any marked line of glens or valleys. It is crossed by all the rivers and some of the lakes which emerge from the southern side of the Grampians, and some of these rivers flow in deep narrow gorges across the line of fracture. Yet in none of these gorges could any trace be found of transverse fracture; on the contrary, they everywhere bore evidence only of long-continued aqueous erosion.

Another point of interest noted in the course of the excursion was the fact that Comrie—a locality so long and widely celebrated for its frequent and sometimes sharp earthquake shocks—lies almost directly over the line of the great fault. This fact seems to be the first of any consequence which has been ascertained in the attempt to connect the abundance of tremors at that place with any geological structure of the ground underneath. From this brief notice it will be seen that there was plenty of geological interest and novelty to keep up the enthusiasm of the party from the beginning to the close of the excursion. Glorious weather and an endless variety of scenery added fresh charms to each day's work, while over the whole came the glee and hearty exuberance which the free open face of nature could not but evoke in men who had been working hard together in town all the winter and spring.

THE U.S. GOVERNMENT BOARD FOR TESTING IRON AND STEEL

IN accordance with "An Act making Appropriations for Sundry Civil Expenses of the Government, for the fiscal year ending June 30, 1876, and for other purposes," approved March 3, 1875, and in reply to a memorial presented to Congress in January last by the American Society of Civil Engineers, the President of the United States has appointed a Board with instructions to determine by actual tests the strength and value of all kinds of iron, steel, and other metals which may be submitted to or procured by it, and to prepare tables which will exhibit the strength and value of these materials for constructive purposes.

The object of this Board is so admirable, and in this, as already in some other similar respects, the U.S. has set an example so worthy of imitation by European Governments, that we shall be doing a service in publishing the details of the organisation of the Board. Congress, we may state, has voted 50,000 dollars to defray the expenses of the Board.

The following are the names of its members:—President, Lieut.-Col. T. T. S. Laidley, U.S.A.; Commander L. A. Beardslee, U.S.N.; Lieut.-Col. Q. A. Gillmore, U.S.A.; Chief Engineer David Smith, U.S.N.; W. Sooy Smith, C.E.; A. L. Holley, C.E.; R. H. Thurston, C.E., Secretary.

The work of the Board is divided into sections, each section being entrusted to a standing committee from the members of the Board. The following are the Sections:—

(A) *On Abrasion and Wear.*—Instructions: To examine and report upon the abrasion and wear of railway wheels, axles, rails, and other materials, under the conditions of actual use.

(B) *On Armour Plate.*—Instructions: To make tests of armour plate, and to collect data derived from experiments already made to determine the characteristics of metal suitable for such use.

(C) *On Chemical Research.*—Instructions: To plan and conduct investigations of the mutual relations of the chemical and mechanical properties of metals.

(D) *On Chains and Wire Ropes.*—Instructions: To determine the character of iron best adapted for chain cables, the best form and proportions of link, and the qualities of metal used in the manufacture of iron and steel wire rope.

(E) *On Corrosion of Metals.*—Instructions: To investigate the subject of the corrosion of metals under the conditions of actual use.

(F) *On the Effects of Temperature.*—Instructions: To investigate the effects of variations of temperature upon the strength and other qualities of iron, steel, and other metals.

(G) *On Girders and Columns.*—Instructions: To arrange and conduct experiments to determine the laws of resistance of beams, girders, and columns to change of form and to fracture.

(H) *On Iron, Malleable.*—Instructions: To examine and report upon the mechanical and physical proportions of wrought iron.

(I) *On Iron, Cast.*—Instructions: To consider and report upon the mechanical and physical properties of cast iron.

(J) *On Metallic Alloys.*—Instructions: To assume charge of a series of experiments on the characteristics of alloys, and an investigation of the laws of combination.

(K) *On Orthogonal Simultaneous Strains.*—Instructions: To plan and conduct a series of experiments on simultaneous orthogonal strains, with a view to the determination of laws.

(L) *On Physical Phenomena.*—Instructions: To make a special investigation of the physical phenomena accompanying the distortion and rupture of materials.

(M) *On Re-heating and Re-rolling.*—Instructions: To observe and to experiment upon the effects of re-heating, re-rolling, or otherwise re-working; of hammering, as compared with rolling, and of annealing the metals.

(N) *On Steels produced by Modern Processes.*—Instructions: To investigate the constitution and characteristics of steels made by the Bessemer, open hearth, and other modern methods.

(O) *On Steels for Tools.*—Instructions: To determine the constitution and characteristics, and the special adaptations of steels used for tools.

The Sectional Committees of the Board, we learn from the official circular sent us, are appointed to conduct the several investigations, and the special researches assigned them in the interval during which the regular work of the Board is delayed by the preparation of the necessary testing machinery, and during such periods of leisure as may afterward occur.

These investigations are expected to be made with critical and scientific accuracy, and will, therefore, consist in the minute analysis of a somewhat limited number of specimens and the precise determination of mechanical and physical properties, with a view to the detection and enunciation of the laws connecting them with the phenomena of resistance to flexure, distortion, and rupture.

The Board will be prepared to enter upon a more general investigation, testing such specimens as may be

forwarded to the President of the Board, or such as it may be determined to purchase in open market, immediately upon the completion of the apparatus ordered, at which time circulars will be published giving detailed instructions relative to the preparation of specimens for test, and stating minutely the information which will be demanded previous to their acceptance.

GUSTAVE THURET

ON the 10th of May France lost one of her most distinguished naturalists. M. Thuret left his home at Antibes in perfect health, and expired at Nice a few hours afterwards from an attack of angina pectoris.

Unlike many of his contemporaries, Thuret was not a voluminous writer. But his papers, though not numerous, are all extremely admirable, and his work has laid the foundation of our modern knowledge of the biological phenomena of the Algæ. Probably his earliest paper was an account of the antherozoids of *Chara* (1840). He was the first to detect the cilia upon these structures in any plant. In 1844 he published an account of the peculiar mode of asexual reproduction in *Nostoc*. In 1845, in conjunction with Decaisne, he described for the first time the antheridia and antherozoids of *Fucus*. In 1850 and succeeding years he published his admirable papers upon the zoospores of different groups of Algæ. In 1853 he established for the first time by actual observation, in the case of *Fucus*, the existence amongst Algæ of the phenomenon of fertilisation. In 1866, in conjunction with Bornet, he described the extremely remarkable phenomena of sexual reproduction amongst the *Florideæ*. They found not merely that the process of fertilisation was accomplished in a very peculiar and remote way, but also that, besides the effect produced on the germ-cell, a series of developments were induced in the parent plant as the result of it. In every group of Algæ the results which he achieved were of the most fundamental kind.

A man of independent wealth, he passed a great part of the year on his property at Antibes, on the shore of the Mediterranean. Bornet, his distinguished collaborator, lived with him. In the gardens which surrounded his house he had assembled one of the most remarkable collections of plants to be found growing in the open air in any part of the world. W. T. T. D.

NOTES

PUNCTUALLY at the time arranged, four o'clock in the afternoon of last Saturday, the *Alert* and the *Discovery*, accompanied by the *Valorous*, left Portsmouth for their work in the Arctic regions. No better equipped expedition, it may again be said, has ever left any country, and no previous British expedition has ever been so universally popular. Every available point on land was occupied by spectators who had come to see the departure of the expedition. The vessels in the harbour and the yachts and boats along the beach were dressed with flags, and as the two ships stood out to sea their course lay through a perfect flotilla of craft of all kinds, whose occupants cheered Capt. Nares and his companions on their way. Among the last messages received by Capt. Nares was a telegram from the Queen "wishing you and your gallant companions every success;" the telegram was accompanied by a packet, the contents of which did not transpire. In the morning the Lords of the Admiralty inspected the ships, and wished the expedition "God speed," Mr. Clements R. Markham accompanies his cousin, Commander Markham, as far as Disco. The ships arrived at Queenstown on Tuesday, the *Alert* and *Discovery* going on to Bantry Bay. The *Valorous* joined them yesterday, when the three proceeded on their way.

MR. GEORGE BENTHAM, F.R.S., has been elected a corresponding member of the French Academy of Sciences.

MR. CHARLES DARWIN has been appointed foreign honorary member of the Imperial Academy of Science, Vienna.

THE Hebdomadal Council of Oxford University have agreed to propose that in the Convocation to be held at the Enconia, or Commemoration, the honorary degree of D.C.L. be conferred on the following persons:—Sir W. R. Grove, F.R.S., Sir J. Lubbock, F.R.S., Mr. E. B. Tylor, F.R.S., Captain Douglas Galton, C.E., F.R.S., and Mr. C. T. Newton.

THE reception at the Royal Society on Wednesday week was a great success; there was a very large attendance of Fellows. There was plenty of opportunity for quiet talk, which was taken ample advantage of. Mr. Crookes repeated his interesting experiments.

GOVERNMENT have refused to send or pay the expenses of a commissioner to the forthcoming International Geographical Congress at Paris. One would have thought that, as much from a practically commercial as from a scientific point of view, this Congress, judging from its programme, is likely to be of the highest importance; and who more likely to reap benefit from such a Conference than the greatest naval and commercial power in the world? Government, however, have the excuse that the French Government simply approve of the Congress, and have refrained from stamping it with an official character.

INVITATION circulars have been issued for the Bristol Meeting by the British Association, whose sittings commence on August 25, under the presidency of Sir John Hawkshaw, C.E., F.R.S. The local secretaries are Messrs. W. Lant Carpenter and John H. Clarke.

M. EDOUARD COLLOMB, who for many years has been the Treasurer of the Geological Society of Paris, has just passed away at the age of seventy-four years. M. Collomb accompanied Agassiz in his Alpine travels. He also travelled during many years in Spain with M. de Verneuil, studying the mineralogical resources of the Iberian Peninsula. The result of these protracted explorations was the publication of the first geological map of Spain.

MR. HENRY WILLETT again appeals for funds to carry on the work of the Sub-Wealden Exploration to a depth of 2,000 feet. A week ago the boring had reached 1,080 feet. It has been decided to continue the boring to 1,500 feet, by which time all the available funds will be exhausted; to do this, 1,200*l.* are wanted, and we cannot think that for the want of so comparatively small a sum the first scientific boring in this country will be brought to a premature conclusion. The latest cones and fossils indicate that the boring is still in the Kimmeridge Clay, to the fauna of which *Ammonites Jason* must now be added.

THE acclimatisation of trout in Tasmania is certified by an official report, which states that in 1873 a total distribution of 4050 trout ova was made from the rivers of that country to the neighbouring colonies; 800 of these ova were sea trout, and the rest brown trout.

THE motion for diminishing the size of the type used in printing the *Comptes Rendus* was lost, because a number of members declared in the private sitting of the Academy that it was impossible for them to read the papers printed with the characters which had been proposed. Consequently it has been resolved that the number of pages given to each paper shall be diminished by one-third part of the number originally allotted.

THE Municipal Council of Paris have voted a sum of 500*l.* to pay the professors of a superior school of Anthropology, which will be opened next November in a building lent gratuitously